



# Acquisition Improvement

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## The System Design Specification (SDS) Primer



# Outline/Agenda

- The Two Pass/Six Gate Process
  - The basics
- System Design Specification
  - Applicability
  - Purpose and Intent
  - Audiences addressed
  - High-Level Training Tasks
  - Training Provided or “How do I get this done?”
  - Where can I learn more?
- Summary



# Acquisition Improvement



- *Directed by:*

SECNAVNOTE 5000 (February 26, 2008);  
Department of the Navy (DON)  
Requirements and Acquisition Process  
Improvements.

- *Implement a review process to improve governance and insight into the development, establishment, and execution of acquisition programs within Department of the Navy (DON).*



# Two Pass/Six Gate Process



Objective: Establish a disciplined and integrated process for requirements and acquisition decision-making within DON, endorsing or approving key Joint Capabilities Integration and Development Systems (JCIDS) and acquisition documents at Gate reviews, and facilitating decisions regarding required Navy and Marine Corps capabilities and acquisition of corresponding material solutions.

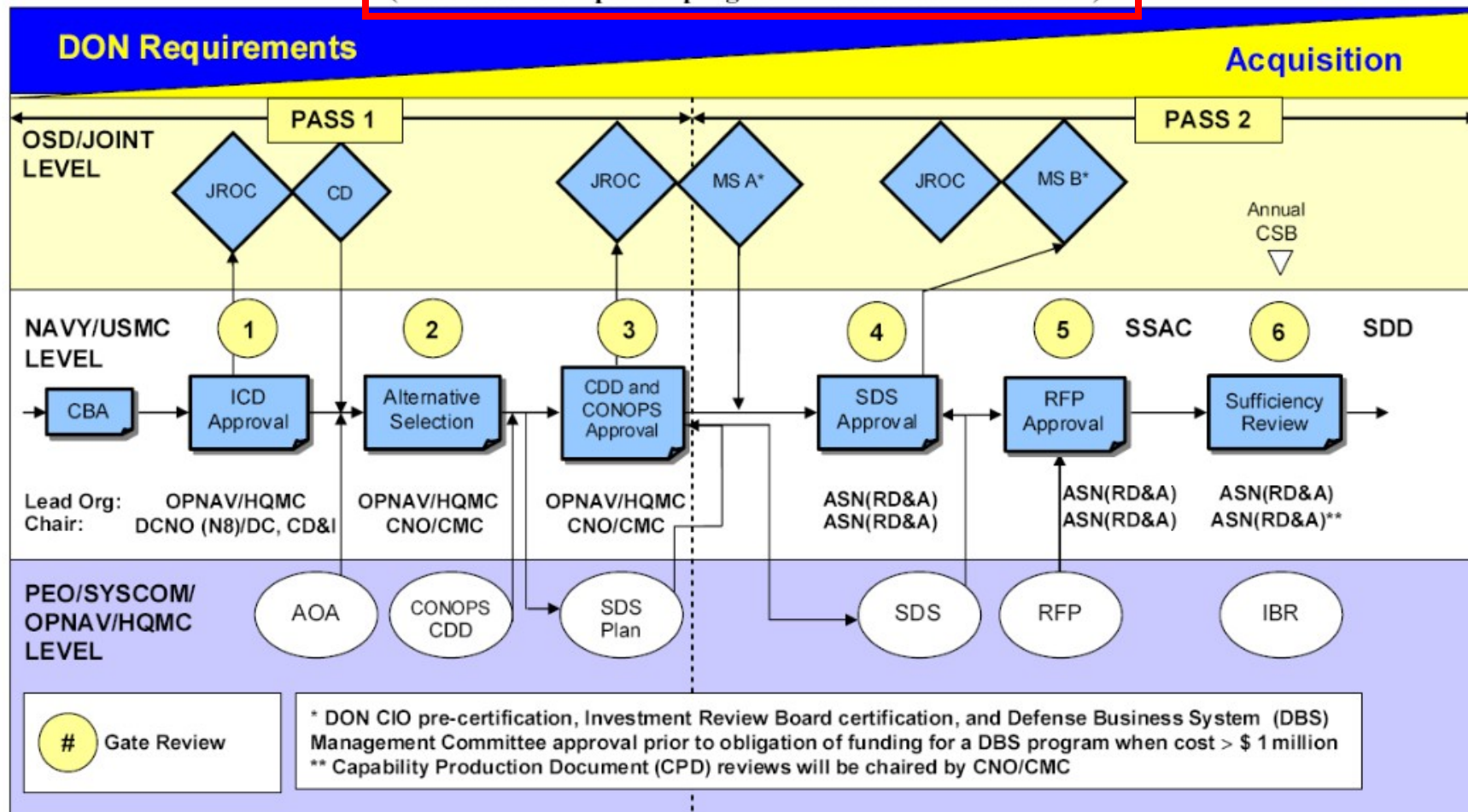


# Two Pass/Six Gate Process



- ❑ Who plays: The process will be implemented in an integrated, collaborative environment that includes participation by appropriate elements from the Office of the SECNAV, the Office of the CNO (OPNAV), the Headquarters Marine Corps (HQMC), and activities involved in developing JCIDS and acquisition documents. Specifically:
  - pre-Major Defense Acquisition Program (MDAP) programs
  - MDAP ACAT I programs
  - pre-Major Automated Information System (MAIS) programs
  - MAIS ACAT IA programs
  - Select ACAT II programs

**DON Requirements/Acquisition Two-Pass/Six-Gate Process with Development of a System Design Specification**  
**(illustrated example for program initiation at Milestone A)**



Enclosure (1)

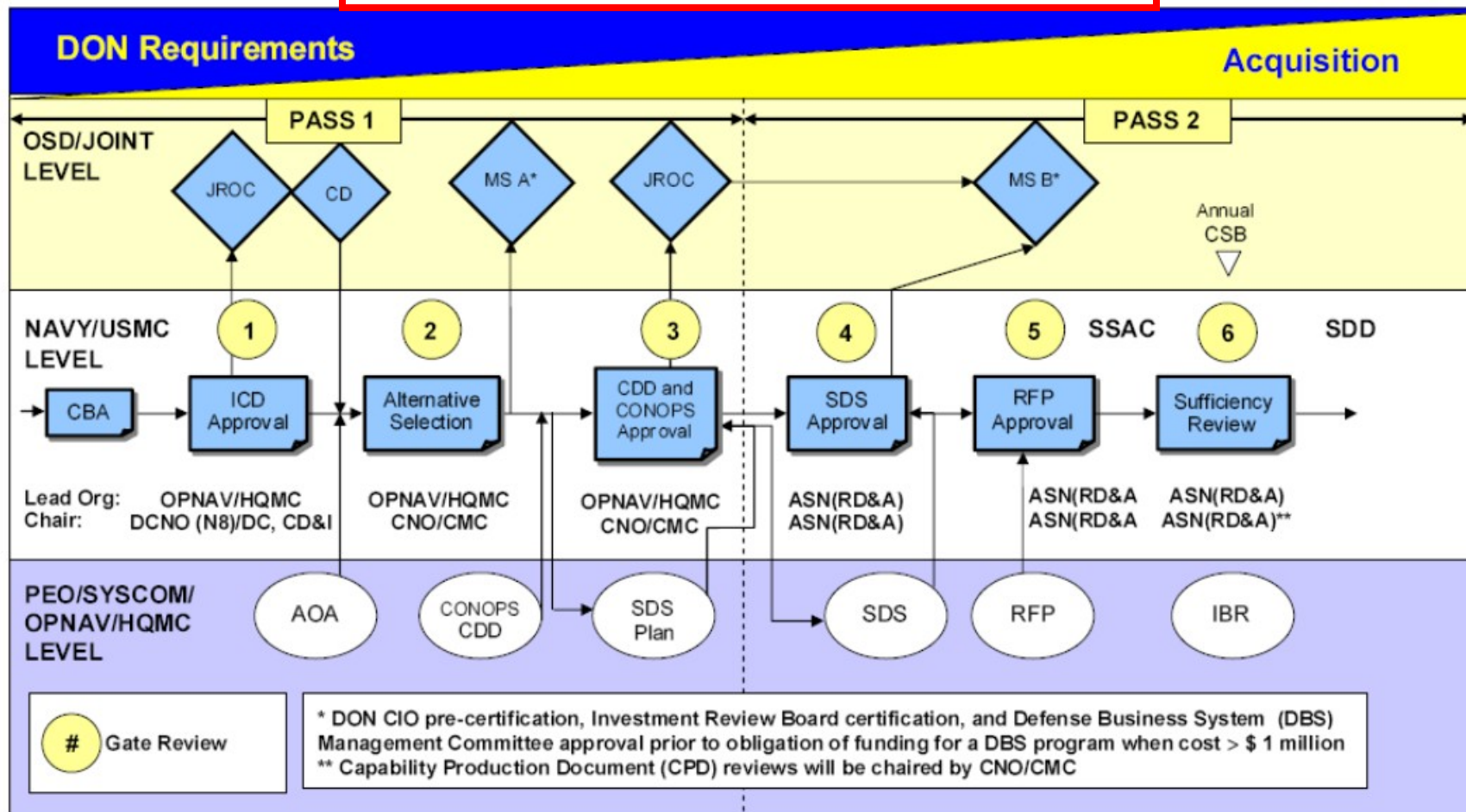
AOA Analysis of Alternative  
 ASN(RD&A) Asst Secretary of the Navy (Research, Development and Acquisition)  
 CBA Capabilities-Based Assessment  
 CD Concept Decision  
 CDD Capability Development Document  
 CMC Commandant of the Marine Corps  
 CNO Chief of Naval Operations  
 CONOPS Concept of Operations  
 CSB Configuration Steering Board  
 HQMC Headquarters Marine Corps

IBR Integrated Baseline Review  
 ICD Initial Capabilities Document  
 JROC Joint Requirements Oversight Council  
 PEO Program Executive Officer  
 RFP Request for Proposal  
 SDD System Development & Demonstration  
 SDS System Design Specification  
 SSAC Source Selection Advisory Council

SECNAVNOTE 5000

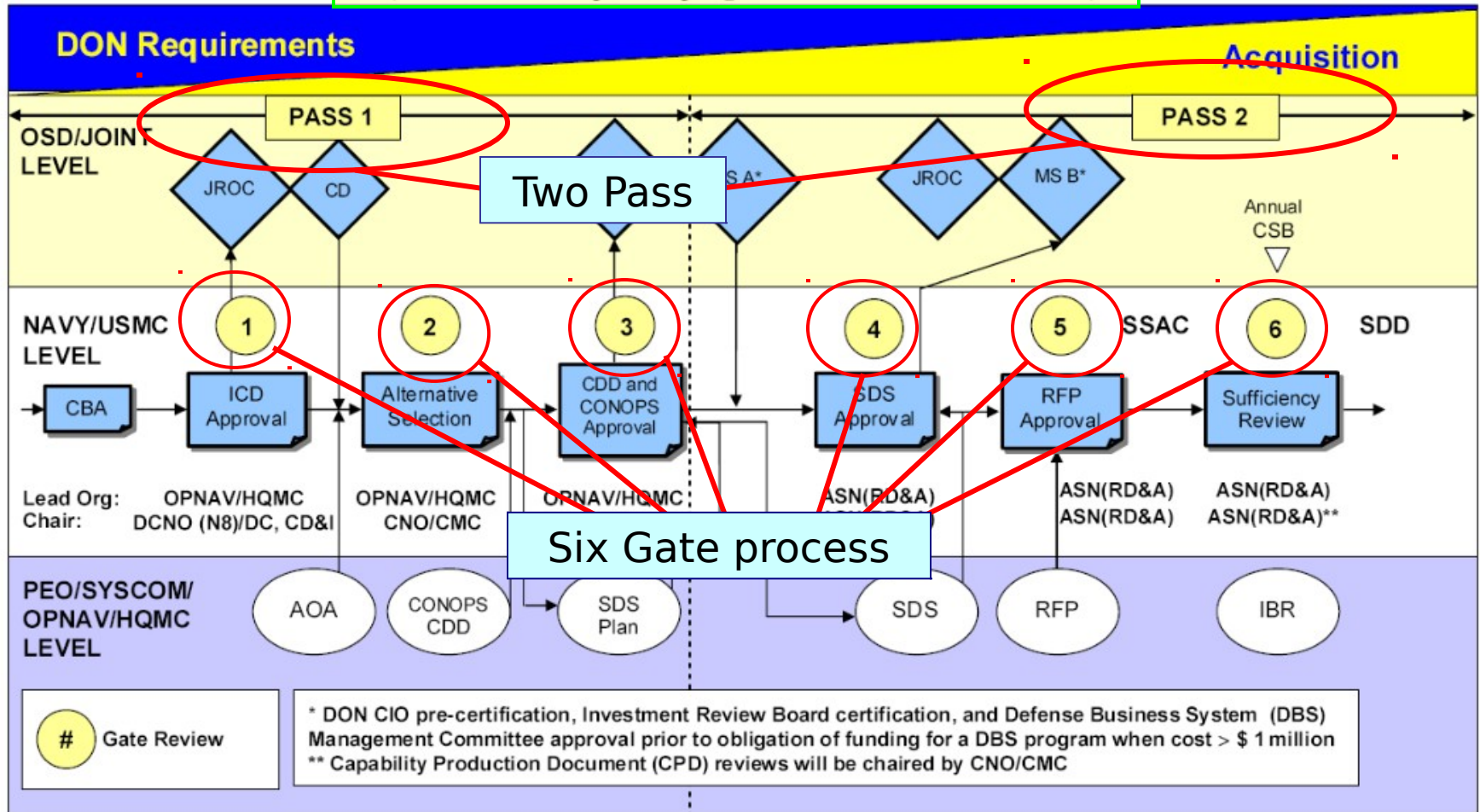


**DON Requirements/Acquisition Two-Pass/Six-Gate Process with Development of a System Design Specification**  
 (illustrated example for program initiation at Milestone B)



AOA	Analysis of Alternative	IBR	Integrated Baseline Review
ASN(RD&A)	Asst Secretary of the Navy (Research, Development and Acquisition)	ICD	Initial Capabilities Document
CBA	Capabilities-Based Assessment	JROC	Joint Requirements Oversight Council
CD	Concept Decision	PEO	Program Executive Officer
CDD	Capability Development Document	RFP	Request for Proposal
CMC	Commandant of the Marine Corps	SDD	System Development & Demonstration
CNO	Chief of Naval Operations	SDS	System Design Specification
CONOPS	Concept of Operations	SSAC	Source Selection Advisory Council
CSB	Configuration Steering Board		
HQMC	Headquarters Marine Corps		

**DON Requirements/Acquisition Two-Pass/Six-Gate Process with Development of a System Design Specification**  
 (illustrated example for program initiation at Milestone A)



Enclosure (1)

AOA  
ASN(RD&A)  
CBA  
CD  
CDD  
CMC  
CNO  
CONOPS  
CSB  
HQMC

Analysis of Alternative  
Asst Secretary of the Navy (Research, Development and Acquisition)  
Capabilities-Based Assessment  
Concept Decision  
Capability Development Document  
Commandant of the Marine Corps  
Chief of Naval Operations  
Concept of Operations  
Configuration Steering Board  
Headquarters Marine Corps

IBR  
ICD  
JROC  
PEO  
RFP  
SDD  
SDS  
SSAC

Integrated Baseline Review  
Initial Capabilities Document  
Joint Requirements Oversight Council  
Program Executive Officer  
Request for Proposal  
System Development & Demonstration  
System Design Specification  
Source Selection Advisory Council

SECNAVNOTE 5000



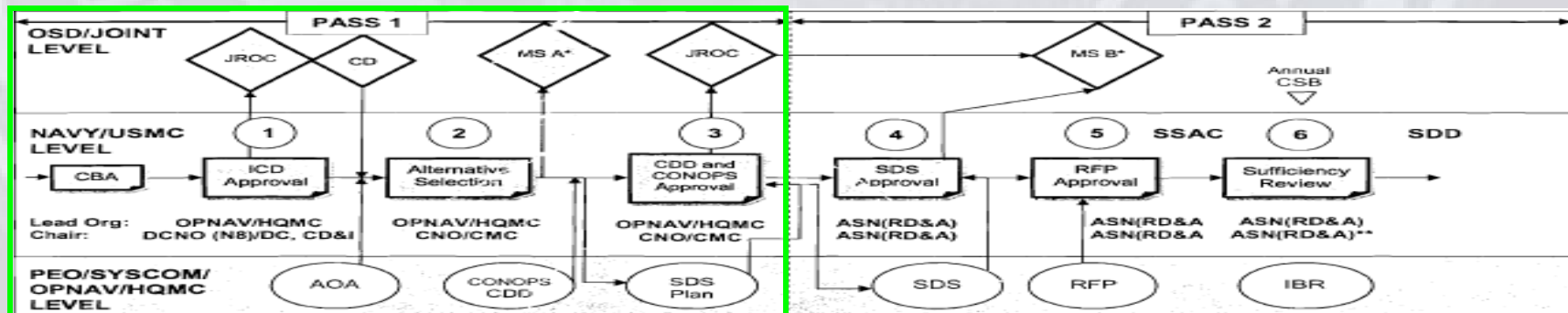


# The Details: Pass One



**Pass One:** Pass One is lead by CNO or CMC, and encompasses three “**requirement**” gates; Gate One, Gate Two, and Gate Three.

- Pass One starts prior to Concept Decision, continues through Concept Refinement, and ends after Gate Three. It includes:
  - DON
  - Office of the SECDEF (OSD)
  - Joint Process for approval of:
    - Initial Capabilities Document (ICD)
    - Analysis of Alternatives (AoA) Guidance
    - Capabilities Development Document (endorsement / approval)
    - Concept of Operations (CONOPS)
    - System Design Specification (SDS) Development Plan



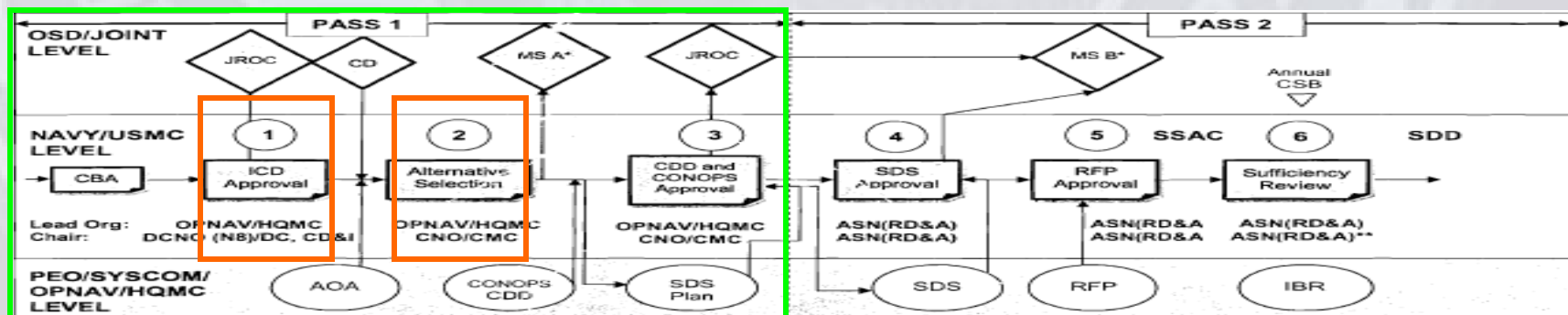


# The Details: Gate One and Gate Two

Gate One: Gate One review will grant authority for draft DON initiated ICD that has completed Service review. Joint routing and approval still follows current JCIDS process. Gate One review also validates proposed AoA Guidance (including international opportunities) and authorizes program to proceed to Concept Decision.

Gate Two: Gate Two review will occur after completion of AoA and prior to a Program meeting Milestone A documentation. It will:

- Review AoA assumptions, analysis, cost estimates, conclusions, and recommendations
- Approve Service's preferred alternatives resulting from AoA analysis
- Approve CONOPS (to include interoperability (domestic and foreign))
- Provide guidance for developing a CDD consistent with preferred alternative (to include technology protection for both domestic and foreign end use)
- Authorize Program to proceed to next event (i.e.:
  - Gate Three when Program Initiation at Milestone A
  - Milestone A when Program Initiation at Milestone B





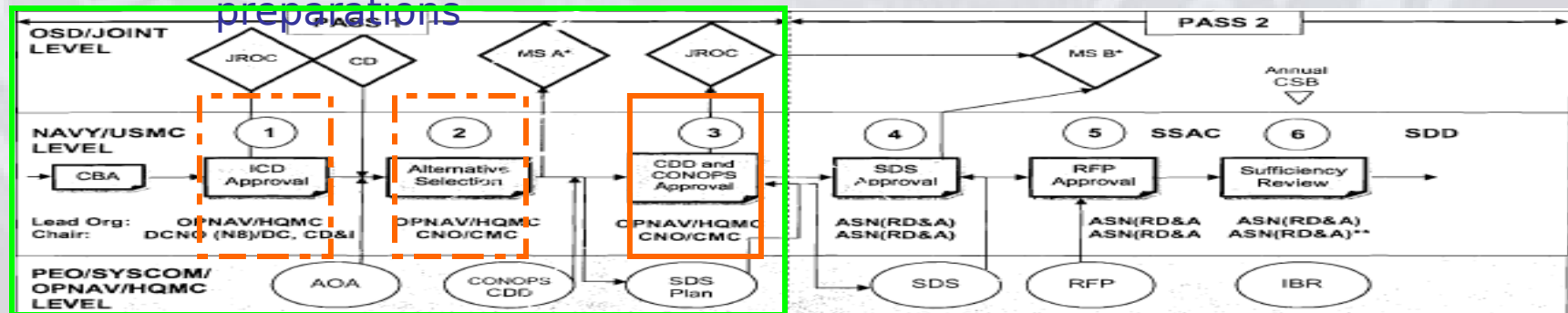
# The Details: Gate Three



Gate Three: Gate Three review will grant authority for a DON-initiated CCD that has completed Service review. Joint routing and approval still follows current JCIDS process. It will include DON approval of the corresponding CONOPS. The CONOPS will include description of capability employment, sustainment, basing, training, manning to support life-cycle cost.

Gate Three review will:

- Validate SDS Development Plan (to include potential for export)
- Serves as input to the follow on Pass Two Gates
- Review Program Health (including cost, risks, & budget adequacy)
- Grant approval to continue with Milestone A or Milestone B preparations



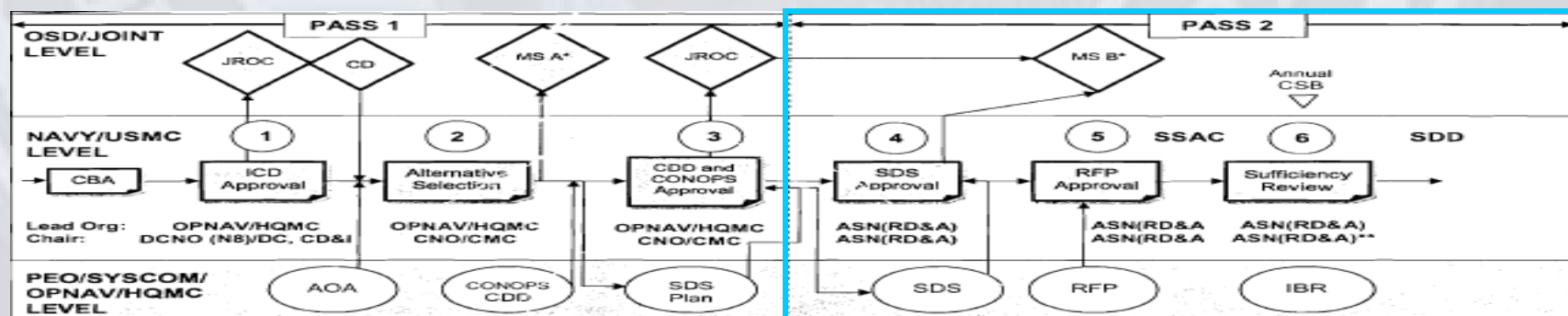


# The Details: Pass Two



Pass Two: Pass Two is lead by the Component Acquisition Executive, and encompasses three “**acquisition**” gates; Gate Four, Gate Five, and Gate Six.

- Pass Two starts after Gate Three and ends after Milestone B during the initial portion of System Development and Demonstration (SDD) Phase. Follow on Gate Six reviews will occur during the SDD and Production and Deployment Phases. All Pass Two reviews will review program health for satisfactory cost, risks, and budget adequacy.







# The Details: Gate Four and Gate Five

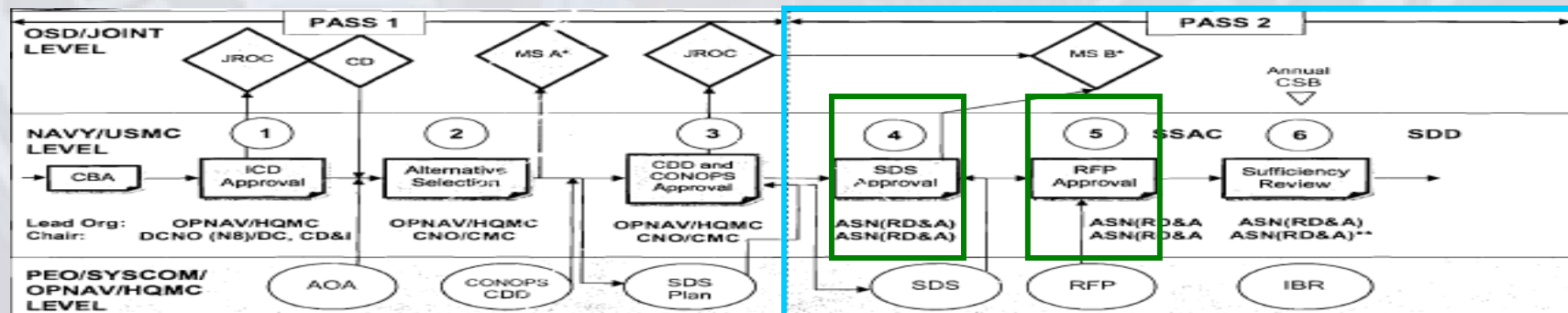


Gate Four: Gate Four review approves the SDS and authorizes a program to proceed to Gate Five or Milestone B.

- The SDS may be an attachment of the SDD Phase Request for Proposal (RFP).
- Gate 4 may be combined with Gate 5 or Milestone B for ACAT IC, IAC, and selected ACAT II programs as determined by SECNAV or ASN(RD&A).

Gate Five: Gate Five review recommends to the Milestone Decision Authority (MDA), approval of the release of the SDD RFP to industry.

- Gate 5 and Milestone B may be combined for ACAT IC, IAC, and selected ACAT II programs as determined by SECNAV or ASN(RD&A).





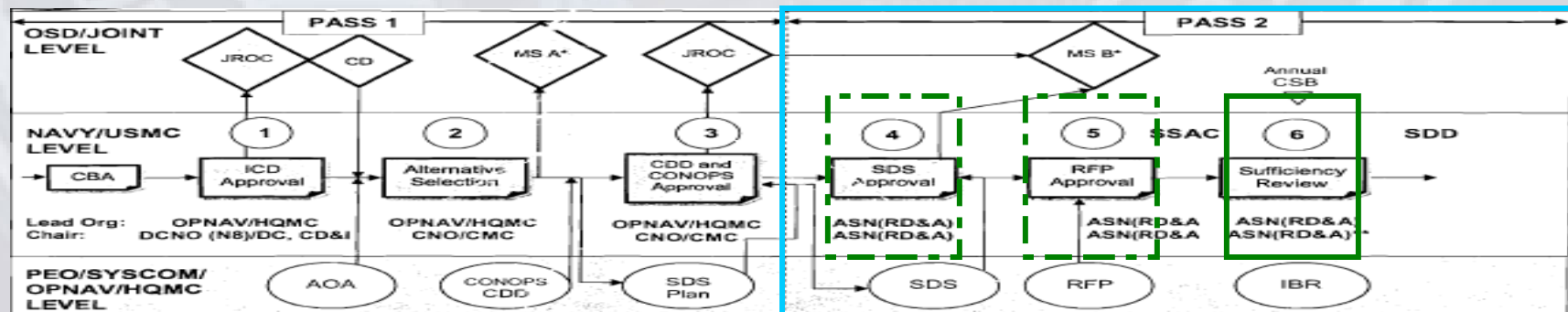
# The Details: Gate Six



Gate Six: Gate Six review assesses overall program health including readiness for production, the sufficiency of the SDS, the Earned Value Management System (EVMS), Program Management Baseline (PMB), and the Integrated Baseline Review (IBR). Gate Six occurs following award of the SDD contract and satisfactory completion of the IBR, and follow on reviews will occur:

- To endorse or approve the Capability Production Document (CPD)\*
- Review program health:
  - Prior to and post Milestone C
  - Full-Rate Production Decision Review (FRP DR)
- Serve as forums for Configuration Steering Boards (CSB)

*\*Chaired by CNO/CMC, or Designee*





# Acquisition Improvement

## System Design Specification (SDS)

### What is it?

A Program Office tailored document that identifies technology development risks, validates preferred system design solutions, evaluates manufacturing processes, refines system requirements, and is an input for acquisition program baseline in order to inform decision makers earlier in the acquisition. The SDS is approved at Gate Four.



# Purpose and Intent

- Purpose:
  - The System Design Specification (SDS) derives the platform specific Mission Performance requirements and attributes from higher level capability documents.
  - Second, the SDS identifies Naval and Industry Design Criteria and Standards that are used during system development.
  - Lastly, the SDS details the expected producibility, operability, allied interoperability (Joint & Coalition), maintainability, and supportability of the system.
- Intent:
  - The SDS will provide greater insight into capabilities, technology protection, schedule, costs and risks of the system earlier in the acquisition process thus reducing risk associated with the design and acquisition of the system.





# The SDS Does Not...



- Replace any of the current system engineering specifications required for system development
- Take the place of any current program management cost or schedule tool (CAIG, ICE, IMS etc.)
- Reverse any acquisition reforms currently in place
- Eliminate the need to consider system unique statutory and regulatory requirements (i.e. intelligence systems, vehicular systems, ship systems etc.)
- Eliminate the need to ensure family of systems, system of systems interoperability at the Naval, Joint and Coalition level.



# Audience

- The SDS is not developed or utilized solely by the Program Manager, nor does it replace any current documents or specifications. It is a living document used by all participants involved with System Design. At a minimum the following disciplines will develop the SDS:
  - Systems Engineering
  - Program Management
  - Logistics
  - Science & Technology
  - Capabilities Development



# High Level Training Tasks

- Develop an SDS utilizing a Systems Engineering Approach
  - Decompose CDD/CONOPS into:
    - Specified and Derived Key Performance Parameter (KPP) components
    - Specified and Derived Key System Attribute (KSA) components
    - Specified and Derived Alternative Attribute (AA) components
  - Derive Preliminary Design
    - Define/Describe System characteristics
    - Define/Describe any preferred solutions
    - Define/Describe/Develop system technology needs and recommended "off-ramps"
    - Define/Describe/Develop system 'ilities
      - Producibility
      - Operability
      - Maintainability
    - Define/Derive/Develop system verification/certification matrix
    - Define/Derive/Develop system risks associated with development (technical, producible, operable and maintainable)
    - Perform and document trade studies



# The SDS Guidebook

## System Design Specification Guidebook

### What is it?

- The SDS Guidebook has been developed to assist in preparing the SDS.





# The SDS Guidebook

- The SDS Guidebook is composed of the following sections
  - Base document:
    - The Base document applies to all systems who must complete an SDS during the course of their development process.
  - Platform specific Appendices:
    - Appendix A: Ship Specific
    - Appendix B: Air Specific
    - Appendix C: C4I Specific
    - Appendix D: Land Specific
    - Appendix E: Integrated Warfare, Combat, Weapon Systems Specific
- The following training package applies to the base document only and is based on the high-level training tasks. Sponsoring commands are responsible for providing additional training specific to each appendix as it relates to their systems and programs (i.e. Appendix A: NAVSEA – SHIPS)



# Specified and Derived Parameters & Attributes



- The Systems Engineering process provides for a decomposition of capability needs from high level documents (CDD/CONOPS) into engineering parameters and system attributes through the Requirements Analysis process. (What is different about the SDS?)
  - Should key in on the following:
    - Interface Documents
    - If not already documented, detail any dependencies (other systems, processes, technology etc.) that the system will have in order to fully achieve it's KPPs, KSAs or AAs (whether specified or derived).
    - What is the relative risk of each of the KPPs, KSAs or AAs (i.e. if we don't achieve this it will...)?
    - How are each allocated to system functions?



# System Characteristics

- Answers the question: “What are we buying?”

- A picture is worth a thousand words

- Artist conceptual drawings
- Sketches
- Models



- Use a narrative to help convey complex concepts:

- Could be helpful with some C4I programs
- Software intensive systems
- International considerations
- Etc.





# Preferred Solutions

- What is a preferred solution?
  - A preferred solution is any material or process that has already been developed for government use. Examples:
    - Torpedo ejection system
    - Crew Served weapons mount for wheeled or tracked vehicles
    - Software interface for another system (API)
    - Foreign systems
- Why preferred solution?
  - This is the PMs opportunity to define for senior leadership and industry what the system should and should not incorporate (no “reinvention”)
  - Open systems architecture and reuse
    - If the government already bought it, why should we buy it again?





# Technology

- What are the systems technology needs?
  - Lay out the system technology dependencies.
    - Include current TRL and affected portion of the system baseline
    - Include technology protection needs
- What do we do if the required technology does not mature in time to meet cost or schedule?
  - What is the “off-ramp”?
    - Revert to more mature technology? And what is the affect on capability?
    - Plan for new technology in P3I? How will this affect the capability of the system?
    - Other???



# “Producibility”

- Producibility minimum information required:
  - Identify the Industrial Base that supports the system production
  - Identify what major industrial plant facilities and equipment are required
  - An analysis of industry’s workforce and identification of any critical skills required for product manufacture.
  - Commonality and Strategic Sourcing
  - Identification of Make/Buy decisions that are required during program execution and what factors will determine what the decision will be. Identify GFE/GFI and GOTS/COTS that will be provided and its availability.
  - Identify the Assemble and Test Strategy to the level appropriate for this point in the design
  - Identify how Naval Open System Architecture Standards will be incorporated
  - Identify Critical Program Information (CPI) and how technology protection, anti-tamper, and similar measures have been incorporated into the system design for both domestic and foreign end use.
- Design for Export



# “Operability”

- Operability minimum information required:
  - An analysis of Integrated Logistic Support (ILS) strategies and key decisions that must be made regarding the selection of the strategy.
  - The expected manning levels to operate the system will be presented.
  - Special storage and transportation requirements for the system will be highlighted. A link to the derived requirements will be highlighted.
  - Deployment and training cycles will be described if applicable.
  - Derived Training Requirements and the infrastructure required to provide training will be highlighted.
  - Disposal plans for the system will be presented



# “Maintainability”

- Maintainability minimum information required:
  - Levels of Depot, Intermediate and Organization maintenance identified and the rationale presented.
  - Describe how  $A_0$  has been developed for the system, identifying key components and attributes.
  - Describe any special tooling or facilities that are required to support the proposed maintenance strategy. Describe any special skills that are required to conduct maintenance and the availability of those skills.
  - Describe how Human Systems Integration (HSI) has been incorporated
  - Identify training required by all levels of the maintenance structure in order to perform the scheduled maintenance



# Verification/Certification

- “Show me!”
  - Develop a verification/certification matrix for the information derived from the CDD/CONOPS in order to answer the following:
    - How will we prove that the system design meets the capabilities detailed in the CDD/CONOPS?
      - To what degree will it meet them?
      - How do we assure the war fighter that the system will perform as intended?
      - Special tools or techniques that are required for verification/certification?
      - Verification/certification dependencies (other systems, personnel etc.)
  - An example matrix can be found at: [www.\\_\\_\\_\\_\\_](http://www._____.mil) or utilize the matrix and process stipulated by your command.





# Risk

- Risk is inherent in all that we do.
  - Present the technology risks using risk tools
  - Identify likelihood of occurrence and consequence is risk becomes reality
  - Present “Off Ramp” options
  - That risk will be depicted here (both individual and overall)
    - Paint the risk picture for senior leadership as accurately as possible.
      - What are the high risk areas and how do they affect development?
    - If mitigation strategies have been developed or are already in place, state so with each associated risk.
    - If mitigation strategies are in development, state that as well and when they will be in place.
- An example matrix can be found at:  
<https://akss.dau.mil/dag/DoD5000.asp?view=document>



# Is there more?

- Yes!
- Now that you have progressed through the base document you need to complete your system specific appendix.
  - Appendix A: Ship Specific (NAVSEA)
  - Appendix B: Air Specific (NAVAIR)
  - Appendix C: C4I Specific (DASN C4I)
  - Appendix D: Land Specific (MARCORSYSCOM)
  - Appendix E: Integrated Warfare, Combat, Weapon Specific (DASN IWS)
  - See the sponsoring command for training and guidance in the preparation of these system specific appendices and associated spec trees.
- Once you have that complete, you will be ready to prepare for your Gate 4 Review.



# Summary

- The Two Pass/Six Gate process is a SECNAV sponsored acquisition improvement effort.
  - It applies to all DON ACAT I, IA and II programs
- The SDS will provide greater insight into capabilities, technology protection, schedule, costs and risks of the system earlier in the acquisition process thus reducing risk associated with the design and acquisition of the system. It will do this by:
  - Deriving the platform specific Mission Performance requirements and attributes from higher level capability documents.
  - Identifying Naval and Industry Design Criteria and Standards that are used during system development.
  - Detailing the expected producibility, operability, maintainability, and supportability of the system.
- The SDS has two primary audiences:
  - Navy/USMC senior leadership (decision makers)
  - Private industry
- The SDS Guidebook is composed of two components
  - Base document
  - System specific appendix
- The SDS with other acquisition information will form the basis of knowledge required for a Gate 4 Review



# References

- DoD Directive 5000.1, The Defense Acquisition System, of 12 May 03
- DoD Instruction 5000.2, Operation of the Defense Acquisition System, of 12 May 03
- Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170.01F, Joint Capabilities Integration and Development System, of 1 May 07
- Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3170.01C, Operation of the Joint Capabilities Integration and Development System, of 1 May 07
- SECNAVINST 5000.2C
- SECNAVINST 5420.188F
- Vice Chief of Naval Operations (VCNO) Memorandum 5420 N09, Resources and Requirements Review Board (R3B) Charter, of 23 Mar 06
- CMC Policy Memorandum 1-02 of 17 JAN 02



# Templates

The following nine templates are available for use in developing the Gate 2 (SDS Plan) and Gate 4 (SDS Approval) briefing material

- SDS Template of the "ilities"
- Mission Performance
- Major Technology Development Focus Area
- Navy Design Criteria
- Operability
- Maintainability
- Producibility
- Industrial Base / Work Force
- SDS Summary





# System Design Specification Templates



## A: Mission Performance (Platform Specific)

- **CONOPS/COOP**
- **KPP 1 - Speed**
  - Derived Requirement A
  - Derived Requirement B
  - Derived Requirement C
- **KPP 2 - Endurance**
  - Derived Requirement A
  - Derived Requirement B
  - Derived Requirement C
- **KPP N**
- **Other Platform Specific Requirements**
- **Cost Expectations**
- **KSA 1 - Platform Performance**
  - Max Speed
  - Cruise/Sustained Speed
- **KSA 2 - Platform Stealth**
  - RCS
  - IRCS
- **KSA N**
- **Technology Development Risk Areas**
- **Environmental Factors**
- **Information Velocity**

## B: Navy Design Criteria

- **Shock/Vibration**
- **Survivability/Vulnerability**
- **Reliability/Maintainability/Availability**
- **Human Systems**
- **Structure**
- **Maneuvering & Handling**
- **Mass Properties Policy**
- **Margin Policy**
- **Information Assurance**
- **EMI/HERO**
- **Statutory & Regulatory**
- **ESOH Requirements**
- **Force Protection Requirement**
- **NSS Supportability - Bandwidth**
- **Quality of Service Requirement**
- **Open System Architecture Design**
- **Navy Enterprise Architecture Standards**
- **Wartime Reserve Mode (WAR) Requirements**

## C: Producibility, Operability & Maintainability

- **Production Steps, Strategy (Who can/How can it be built)**
- **Commonality**
- **Modularity**
  - Construction
  - Mission Systems
  - Electronics/Avionics
- **Commodity/Strategic Component Sourcing**
- **Process, Plant Equipment,**
- **Workforce**
- **Material Selection**
- **Distributed Systems**
- **Assy and Test Strategy**
- **Deployment/Training/Support/Disposal Plans, Schedules, Policies and Procedures**
- **Special Storage/Transportation/Training Requirements**



# Mission Performance

## Specification Outline and Objectives

### 1 SCOPE

- 1.1 IDENTIFICATION
- 1.2 SYSTEM OVERVIEW
- 1.3 DOCUMENT OVERVIEW

### 2 REFERENCED DOCUMENTS

### 3 SYSTEM-WIDE DESIGN DECISIONS

### 4 SYSTEM ARCHITECTURAL DESIGN

#### 4.1 COMPUTING ENVIRONMENT

- 4.1.1 Computing Processors
- 4.1.2 Display Architecture

#### 4.2 SYSTEM ELEMENTS

- 4.1.1 Radar
- 4.1.2 Weapon & Vehicle Control
- 4.1.3 Weapon Control
- 4.1.4 Weapon Control
- 4.1.5 EXCOMM Control
- 4.1.6 Ship Control
- 4.1.7 Tomahawk
- ...
- ...

#### 4.2 CONCEPT OF EXECUTION

#### 4.3 INTERFACE DESIGN

- 4.3.1 Interface identification and diagrams

### 5 REQUIREMENTS TRACEABILITY

### 6 NOTES

#### A: Mission Performance (Platform Specific)

- CONOPS/COOP
- KPP 1 - Speed
  - Derived Requirement A
  - Derived Requirement B
  - Derived Requirement C
- KPP 2 - Endurance
  - Derived Requirement A
  - Derived Requirement B
  - Derived Requirement C
- KPP N
- Other Platform Specific Requirements
- Cost Expectations
- KSA 1 - Platform Performance
  - Max Speed
  - Cruise/Sustained Speed
- KSA 2 - Platform Stealth
  - RCS
  - IRCS
- KSA N
- Technology Development Risk Areas
- Environmental Factors
- Information Velocity

Define initial total ship system architecture for system requirements review (SRR)

- Architecture crafted to achieve System (X) total ship requirements
- Document Mission Systems architecture implementation in a System/Subsystem Design Document (SSDD)

Support cost and POM planning

Identify risks and support risk mitigation planning (size of development, alternate paths, etc)

Support EDM planning and definition

Support Performance Analysis and Functional Architecture Trade Studies

Provide list for Platform Specific major systems alignment with validated KPP/KSA capabilities and additional attributes with emphasis on traceability.

(Reference: DI-IPSC-81432A)



# Major Technology Development Focus Areas

Requirement	Technology Risk Areas	Risk Reduction Measures	Off Ramp Triggers for re-review
Technology must provide XYZ...	<ul style="list-style-type: none"><li>List applicable risk areas</li></ul>	<ul style="list-style-type: none"><li>Provide options for risk mitigation against all risk areas</li></ul>	<ul style="list-style-type: none"><li>Identify Trigger for Off Ramp</li></ul>
Technology must be capable of ABC...	<ul style="list-style-type: none"><li>List applicable risk areas</li></ul>	<ul style="list-style-type: none"><li>Provide options for risk mitigation against all risk areas</li></ul>	<ul style="list-style-type: none"><li>Identify Trigger for Off Ramp</li></ul>
Technology is expandable to 123...	<ul style="list-style-type: none"><li>List applicable risk areas</li></ul>	<ul style="list-style-type: none"><li>Provide options for risk mitigation against all risk areas</li></ul>	<ul style="list-style-type: none"><li>Identify Trigger for Off Ramp</li></ul>
Technology supports other mission areas 123, ABC,...	<ul style="list-style-type: none"><li>List applicable risk areas</li></ul>	<ul style="list-style-type: none"><li>Provide options for risk mitigation against all risk areas</li></ul>	<ul style="list-style-type: none"><li>Identify Trigger for Off Ramp</li></ul>

Provide Major Technology Developments, Risk Areas & Management, Off Ramps, and associated "Triggers" for re-reviewing.



# Navy Design Criteria

## System Performance Requirements Specification

### 1. Scope

- 1.1 System Description

### 2. Applicable Document

- 2.1 Government Documents
- 2.2 Non-Government Documents

### 3. Platform (X) System Requirements

- 3.1 System Performance
  - 3.1.1 Mission Capability
  - 3.1.2 Sea Strike
  - 3.1.3 Sea Strike
  - 3.1.4 Sea Strike
  - 3.1.5 Sea Strike
  - 3.1.6 Sea Strike
  - 3.1.7 Sea Strike
  - 3.1.8 Replenishment
  - 3.1.9 Crew Support
  - 3.1.10 Administration and Supply
  - 3.1.11 . . .
- 3.2 Interface Requirements
- 3.3 Physical Requirements
- 3.4 Survivability
- 3.5 Availability
- 3.6 Security

Examples...

### 4. Validation and Verification

### 5. Preparation for Delivery

### 6. Notes

#### B: Navy Design Criteria

- Shock/Vibration
- Survivability/Vulnerability
- Reliability/Maintainability/Availability
- Human Systems
- Structure
- Maneuvering & Handling
- Mass Properties Policy
- Margin Policy
- Information Assurance
- EMI/HERO
- Statutory & Regulatory
- ESOH Requirements
- Force Protection Requirements
- NSS Supportability - Bandwidth/Quality of Service Requirements
- Open System Architecture Design
- Navy Enterprise Architecture Standards
- Wartime Reserve Mode (WARM) Requirements

This section defines the statutory and regulatory requirements, industry standards, Navy instructions, and program policies that are applicable to Platform (X). Linkage of the standard to the specific platform system requirement is desired. If any of these guidance documents/standards require tailoring, it should be noted how they will be tailored and for what reason.



# Operability

## Operational and Non-Operational Environments Specification

### 1. Scope

#### 1.1 System Description

##### 1.1.1 The Platform (X) Operational and Non-Operational Environments Specification

### 2. Applicable Document

#### 2.1 Government Documents

##### 2.1.1 Specifications and Standards

#### 2.2 Non-Government Documents

### 3. Requirements

#### 3.1 Environmental Requirements

#### 3.2 Development of Environment

### 4. Validation and Verification

### 5. Preparation for Delivery

### 6. Notes

#### C: Producibility, Operability & Maintainability

- Production Steps, Strategy (Who can/How can it be built)
- Commonality
- Modularity
  - Construction
  - Mission Systems
  - Electronics/Avionics
- Commodity/Strategic Component Sourcing
- Process, Plant Equipment, Workforce
- Material Selection
- Distributed Systems
- Assy and Test Strategy
- Deployment/Training/Support/Disposal Plans, Schedules, Policies and Procedures
- Special Storage/Transportation/Training Requirements

The Environments Specification Contains the Platform (X) System Operational and Non-Operational Requirements for Transportation, Storage and Deployment. These Requirements are Traceable to the CDD. The Platform (X) System is Both Shore and Sea Based. This Specification is Part of the System Performance Document. List Requirements allocated to each of the Lower Level Specifications.

Examples...





# Maintainability

## Safety and Environmental Compliance

### 1. Introduction

- 1.1 Identification
- 1.2 System Description

### 2. Applicable Document

- 2.1 Government Documents
- 2.2 Non-Government Documents

### 3. Requirements

- 3.1 General
- 3.2 Training System Requirements
- 3.3 Life Cycle Safety Requirements
- 3.4 Software Requirements
- 3.5 Engagement System Segment
- 3.6 Environmental Compliance

### 4. Quality Assurance

### 5. Preparation for Delivery (N/A)

### 6. Notes

Gate 4 Template

#### C: Producibility, Operability & Maintainability

- Production Steps, Strategy (Who can/How can it be built)
- Commonality
- Modularity
  - Construction
  - Mission Systems
  - Electronics/Avionics
- Commodity/Strategic Component Sourcing
- Process, Plant Equipment, Workforce
- Material Selection
- Distributed Systems
- Assy and Test Strategy
- Deployment/Training/Support/Disposal Plans, Schedules, Policies and Procedures
- Special Storage/Transportation/Training Requirements

This section should provide the maintenance requirements for System (X) and how these requirements will be implemented (i.e. maintenance philosophy). This section should also address the requirements that document the System Level Safety and Environmental Compliance Requirements.



# *Producibility*

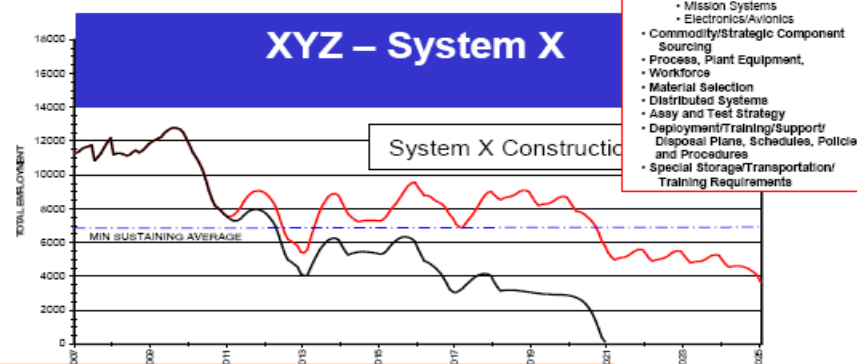
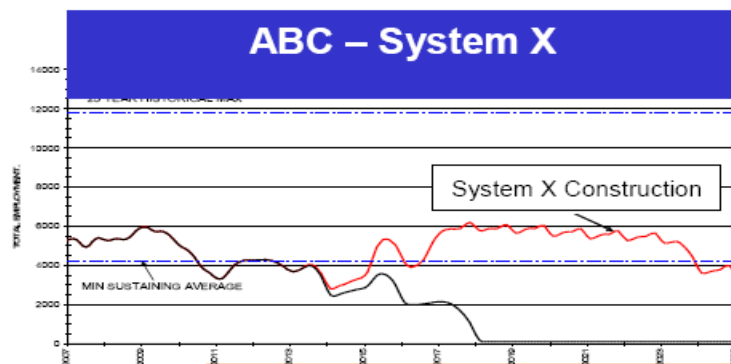
## **C: Producibility, Operability & Maintainability**

- **Production Steps, Strategy  
(Who can/How can it be built)**
- **Commonality**
- **Modularity**
  - Construction
  - Mission Systems
  - Electronics/Avionics
- **Commodity/Strategic Component  
Sourcing**
- **Process, Plant Equipment,**
- **Workforce**
- **Material Selection**
- **Distributed Systems**
- **Assy and Test Strategy**
- **Deployment/Training/Support/  
Disposal Plans, Schedules, Policies  
and Procedures**
- **Special Storage/Transportation/  
Training Requirements**

The section addresses the build strategy and assesses the ability of the total system to be produced by industry, including facilitization and workforce requirements. This section should also address Commonality, Modularity, Commodity/Strategic Component Sourcing, and Material Selection. Highlight deficiencies or gaps.



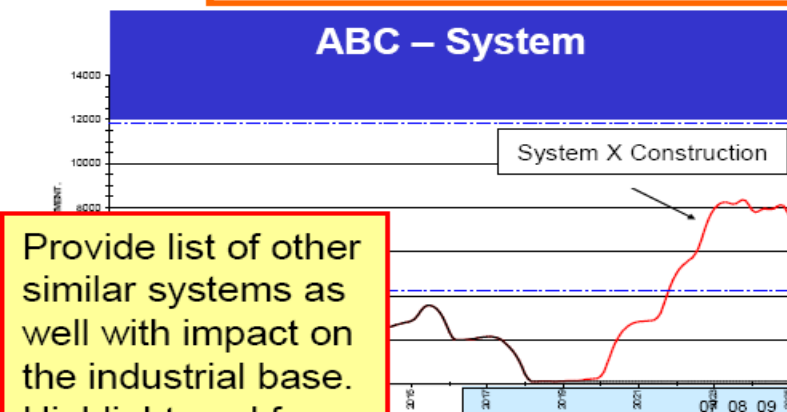
# Industrial Base / Work Force



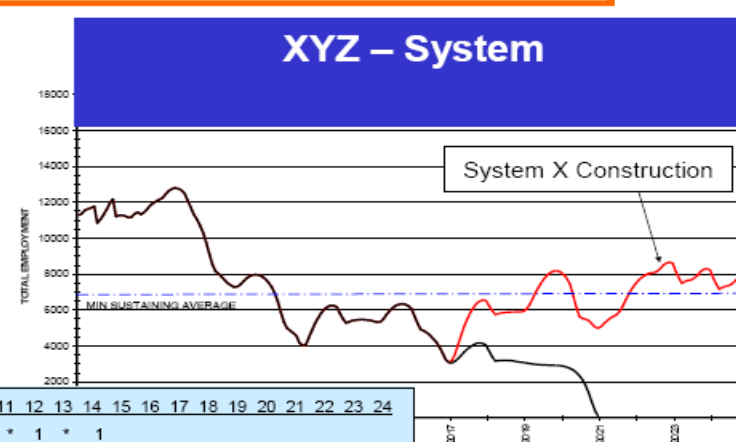
## C: Productibility, Operability & Maintainability

- Production Steps, Strategy (Who can/How can it be built)
- Commonality
- Modularity
  - Construction
  - Mission Systems
  - Electronics/Avionics
- Commodity/Strategic Component Sourcing
  - Process, Plant Equipment,
  - Workforce
- Material Selection
- Distributed Systems
- Assay and Test Strategy
- Deployment/Training/Support/Disposal Plans, Schedules, Policies and Procedures
- Special Storage/Transportation/Training Requirements

**Industrial Base Assessment (20XX-20XX)**  
**List System or systems if multiple options (i.e. Fixed Wing/Rotary)**



Provide list of other similar systems as well with impact on the industrial base. Highlight workforce issues.



	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
SYSTEM A				1*		1	*	1	*	1								
SYSTEM (X) -								1		1	1	1	1	1	1	1	1	
SYSTEM (X) -													1	1	1	1	1	1
*WORKSHARE WITH CONTRACTOR XYZ																		



# System Design Specification Summary



**Mission Performance / Technology Development**

List significant benefits, technology advancement, and/or highlight gaps.

**Design Criteria - Design Maturity**

List significant reuse or risks in technology maturity, and describe off-ramps options.

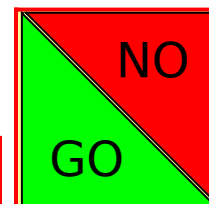
**Producibility, Operability, & Maintainability**

List significant benefits, technology advancement, and/or highlight gaps.

**EXAMPLE**

**Readiness to Proceed**

List significant triggers that could require re-review of system.





# Acronyms

AoA: Analysis of Alternatives Document

CDD: Capability Development

CBA: Capabilities Based Analysis DAB: Defense Acquisition Board

FAA: Functional Area Analysis

FNA: Functional Needs Analysis

FSA: Functional Solutions Analysis Oversight Council

JROC: Joint Requirements

RFP: Request For Proposal Development

SDD: System Design &

SDS: System Design Specification Advisory Council

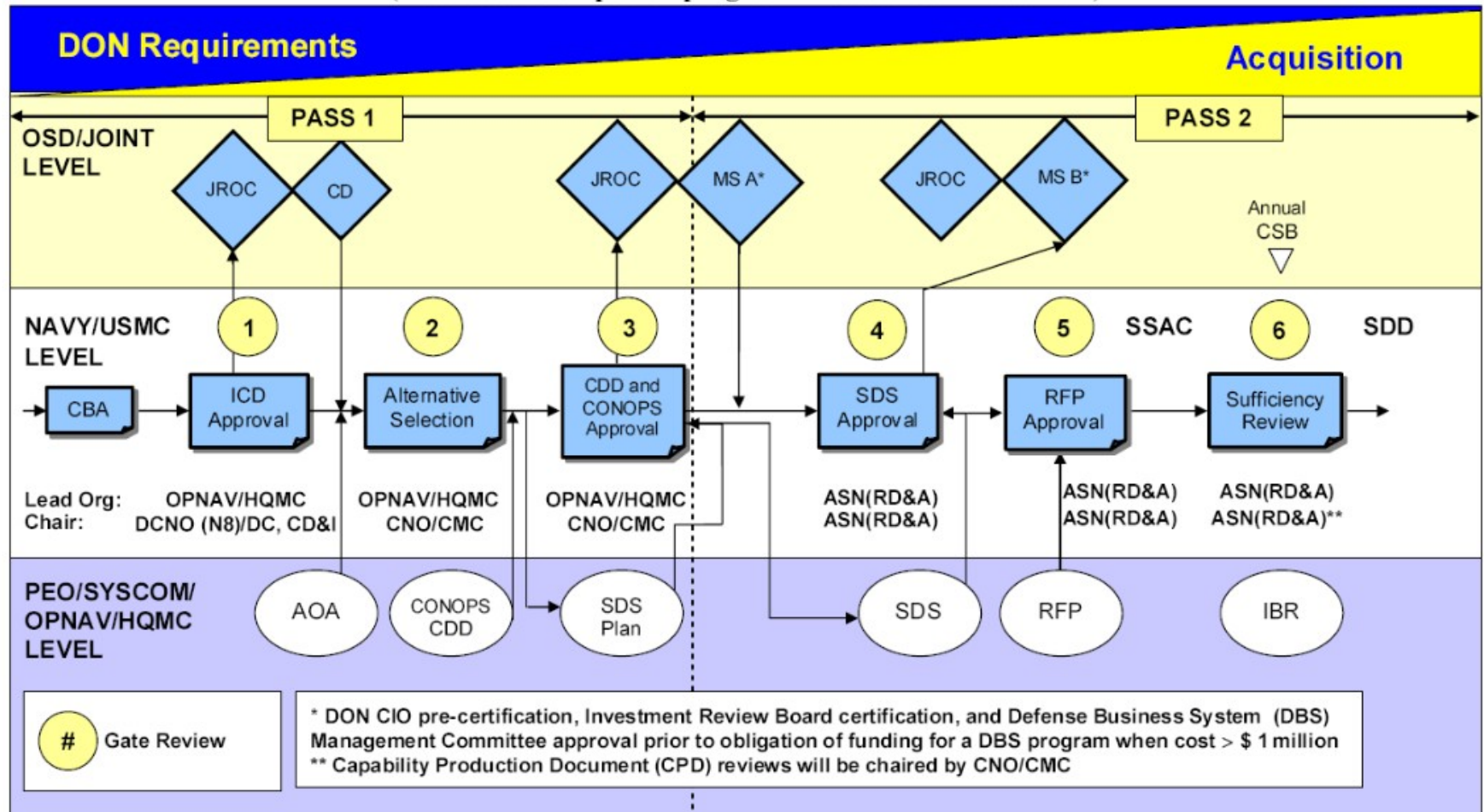
SSAC: Source Selection

CSB: Configuration Steering Board Document

ICD: Initial Capabilities



# DON Requirements/Acquisition Two-Pass/Six-Gate Process with Development of a System Design Specification (illustrated example for program initiation at Milestone A)



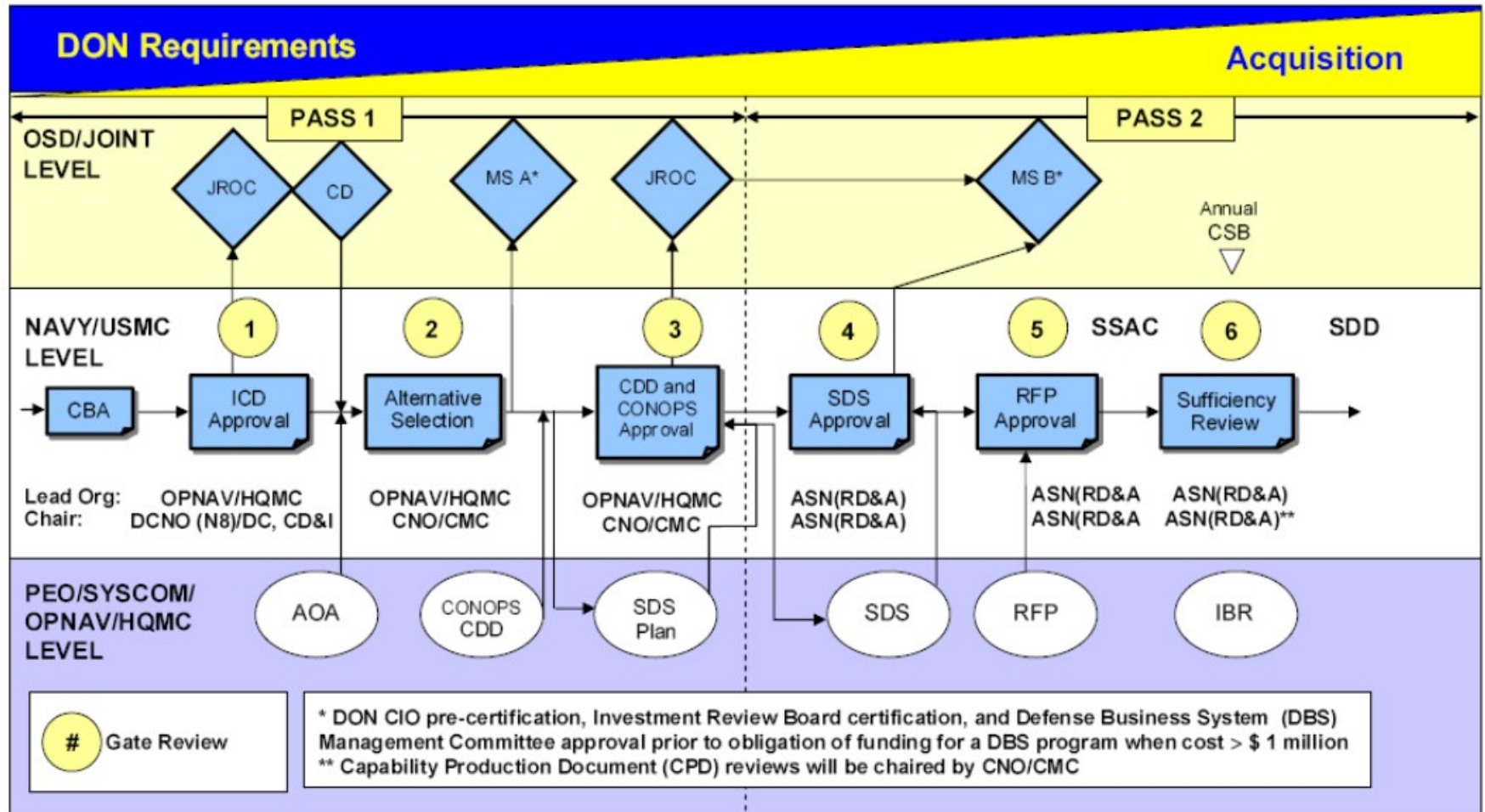
Enclosure (1)

AOA	Analysis of Alternative
ASN(RD&A)	Asst Secretary of the Navy (Research, Development and Acquisition)
CBA	Capabilities-Based Assessment
CD	Concept Decision
CDD	Capability Development Document
CMC	Commandant of the Marine Corps
CNO	Chief of Naval Operations
CONOPS	Concept of Operations
CSB	Configuration Steering Board
HQMC	Headquarters Marine Corps

IBR	Integrated Baseline Review
ICD	Initial Capabilities Document
JROC	Joint Requirements Oversight Council
PEO	Program Executive Officer
RFP	Request for Proposal
SDD	System Development & Demonstration
SDS	System Design Specification
SSAC	Source Selection Advisory Council

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# DON Requirements/Acquisition Two-Pass/Six-Gate Process with Development of a System Design Specification (illustrated example for program initiation at Milestone B)



Enclosure (1)

AOA	Analysis of Alternative
ASN(RD&A)	Asst Secretary of the Navy (Research, Development and Acquisition)
CBA	Capabilities-Based Assessment
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JROC	Joint Requirements Oversight Council
PEO	Program Executive Officer
RFP	Request for Proposal
SDD	System Development & Demonstration
SDS	System Design Specification
SSAC	Source Selection Advisory Council



# Contact

- NAVSEA 05 POC for document is:

Reynolds, Jason A CIV NAVSEA HQ, SEA 05

[jason.a.reynolds1@navy.mil](mailto:jason.a.reynolds1@navy.mil)

Phone: 202-781-1551

- Maintenance and update will be performed by SESG under ASN(RDA) CHENG
- Electronic SDS Documents and SDS Training Primer are available at the Department of Navy; Research, Development & Acquisition, DON (RD&A) website:

[http://acquisition.navy.mil/policy\\_and\\_guidance](http://acquisition.navy.mil/policy_and_guidance)



# Supplemental Training

- Additional Applicability and Gate Review training follows and provides:
  - Lead Organizations
  - Input Criteria
  - Goals / Exit Criteria
  - Brief Content
  - Examples





# Two Pass Six Gate Process

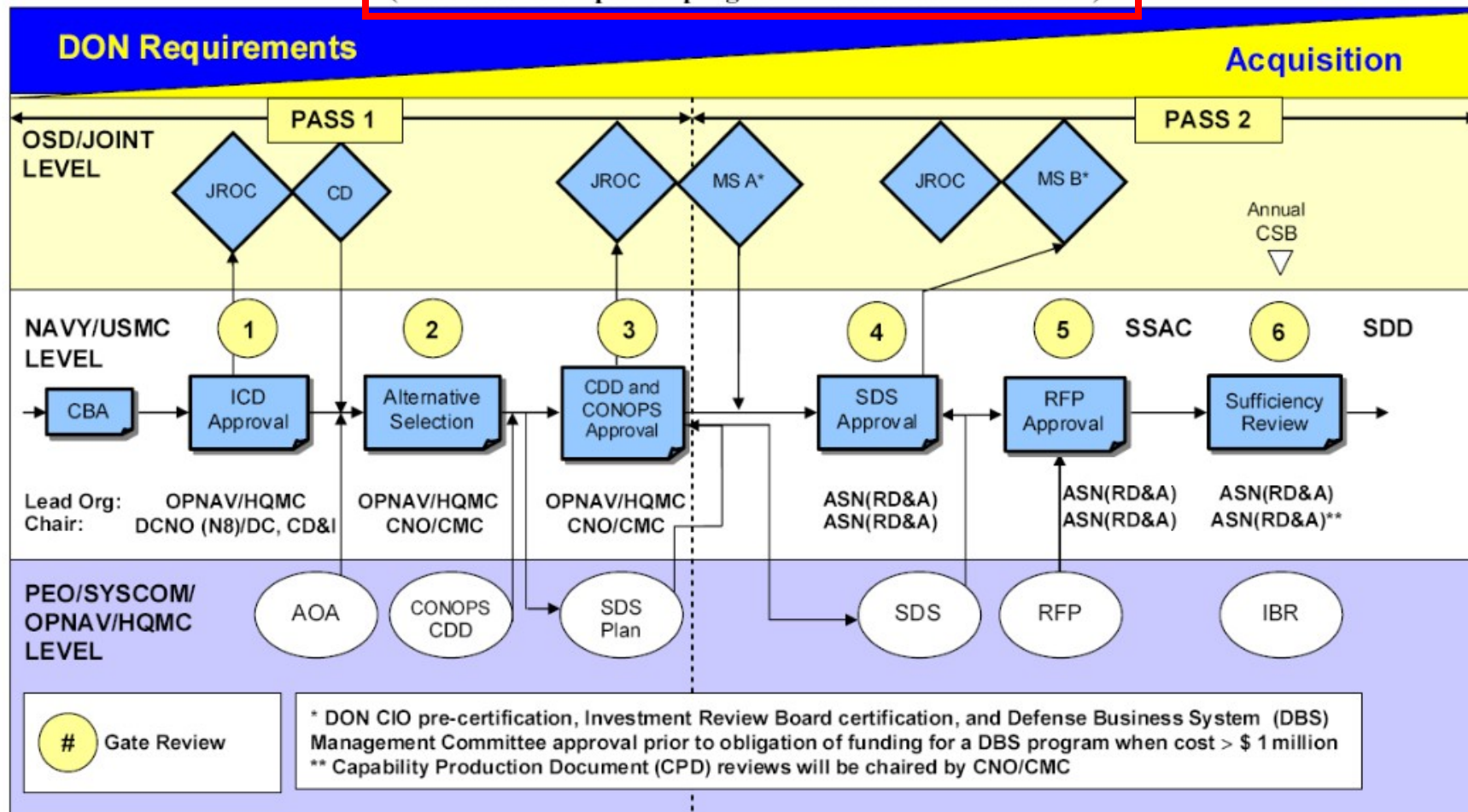
The Two Pass – Six Gate process is integrated into existing acquisition schedule templates referenced in DoD 5000, though Gates vary slightly depending on Program Initiation. There are two flow charts.

1. Program Initiation at MS A (select shipbuilding programs)
2. Program Initiation at MS B



# DON Requirements/Acquisition Two-Pass/Six-Gate Process with Development of a System Design Specification

(illustrated example for program initiation at Milestone A)



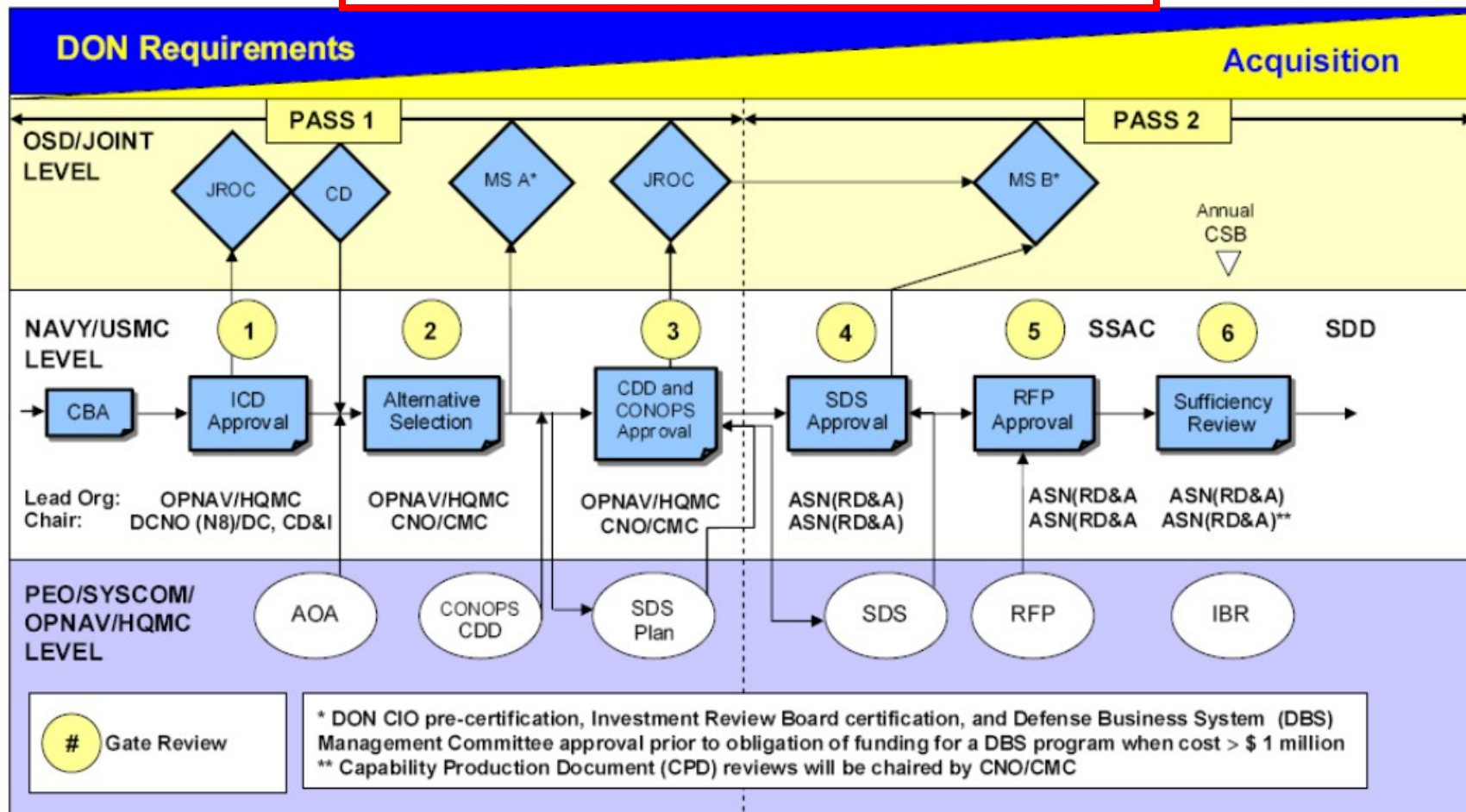
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IBR Integrated Baseline Review  
 ICD Initial Capabilities Document  
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 PEO Program Executive Officer  
 RFP Request for Proposal  
 SDD System Development & Demonstration  
 SDS System Design Specification  
 SSAC Source Selection Advisory Council

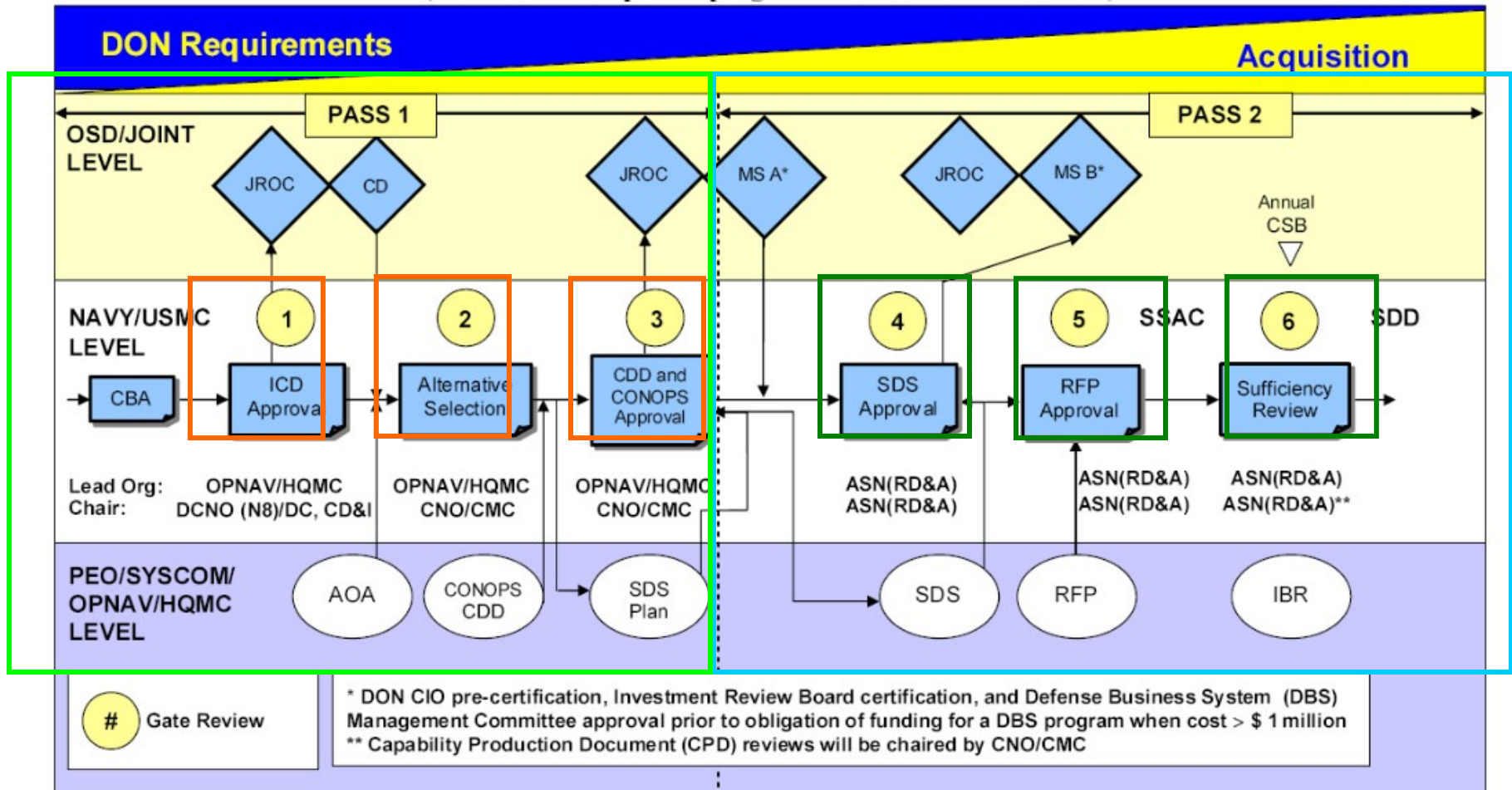
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**DON Requirements/Acquisition Two-Pass/Six-Gate Process with Development of a System Design Specification**  
 (illustrated example for program initiation at Milestone B)



AOA	Analysis of Alternative	IBR	Integrated Baseline Review
ASN(RD&A)	Asst Secretary of the Navy (Research, Development and Acquisition)	ICD	Initial Capabilities Document
CBA	Capabilities-Based Assessment	JROC	Joint Requirements Oversight Council
CD	Concept Decision	PEO	Program Executive Officer
CDD	Capability Development Document	RFP	Request for Proposal
CMC	Commandant of the Marine Corps	SDD	System Development & Demonstration
CNO	Chief of Naval Operations	SDS	System Design Specification
CONOPS	Concept of Operations	SSAC	Source Selection Advisory Council
CSB	Configuration Steering Board		
HQMC	Headquarters Marine Corps		

# DON Requirements/Acquisition Two-Pass/Six-Gate Process with Development of a System Design Specification (illustrated example for program initiation at Milestone A)



Enclosure (1)

AOA Analysis of Alternative  
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CD Concept Decision  
CDD Capability Development Document  
CMC Commandant of the Marine Corps  
CNO Chief of Naval Operations  
CONOPS Concept of Operations  
CSB Configuration Steering Board  
HQMC Headquarters Marine Corps

IBR Integrated Baseline Review  
ICD Initial Capabilities Document  
JROC Joint Requirements Oversight Council  
PEO Program Executive Officer  
RFP Request for Proposal  
SDD System Development & Demonstration  
SDS System Design Specification  
SSAC Source Selection Advisory Council

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# Acquisition Gates Standard Membership

- Voting members
  - CNO / CMC / VCNO / ACMC
  - ASN (RDA) / PDASN
  - OPNAV N8 / HQMC DC P&R and DC CD&I
  - Appropriate SYSCOM Commander (Technical Authority)
  - As required: OPNAV (N1,N2, N3/N5, N4, N6), HQMC M&RA, Intel, PP&O, I&L, DirC4/CIO, USFF, MARFOR, Warfare Enterprise (WE) Lead
- Non-voting members
  - Resource Sponsor - N80 - Fiscal
  - Appropriate DASNs - N81 - Legal
- Review membership attendance limited to Principal or Deputy plus one
- Configuration Steering Board (CSB) begin after source selection
  - ASN(RDA) will chair the board
  - Appropriate OSD AT&L Defense Systems Assistant Director
  - Appropriate Joint Staff Functional Control Board (FCB) Director



# Applicability

- An SDS will be completed for all ACAT I, IA and II programs within the Department of the Navy and presented at Gate Four for review and approval
  - If my program is post MS C, will I have to do one?
    - No. This specification applies to future programs and potentially programs under development.
  - So, if my program is ACAT III or lower the SDS does not apply to me?
    - Not so fast. Special interest programs may have to complete an SDS as well. The determination will be made by ASN(RDA) or the MDA. Additionally, a cognitive authority may direct a program to complete an SDS regardless of ACAT level.





# Gate 1

## Initial Capabilities Document (ICD) Approval

- Lead organizations: OPNAV / HQMC
  - Chair: N8 / HQMC (DC, CD&I) (Co-chaired as appropriate)
  - Members: PDASN, WE Lead, DC, P&R, SYSCOM, OPNAV N2, N8, (As required: N1, M&RA, N3/N5, PP&O, N4, I&L, N6, DirC4/CIO)
  - Non-voting participation: DASN, N80, N81, USFF (N8), MARFOR, Resource Sponsor
- Input Criteria:
  - Objectives of top leadership teams / commander's intent
  - Completed Capabilities Based Analysis (CBA)
  - Completed Naval review of ICD
  - Identification of mutually shared needs from foreign countries.
- Goals / Exit Criteria:
  - Approval of ICD for Joint Staff routing / JROC approval
  - AoA Guidance and Assumptions
    - Spectrum of options & Criteria to be evaluated
  - Approval of AoA timelines
  - Program Office / OPNAV / HQMC Staff requirements identified
  - Approval to proceed to Concept Development



# Gate 1

## ICD Approval (continued)

- Brief Content: JROC compliant ICD brief plus
  - Provide AoA guidance including costs constraints, lifecycle costs, international opportunities
  - DOT\_LPF change recommendations (DCR) inputs
- Example: Navy Unmanned Combat Air System (NUCAS), Next Generation Cruiser (CG(X))



# Gate 2

## AoA Validation

- Lead organizations: OPNAV / HQMC
  - Chair: CNO / CMC / VCNO / ACMC
  - Members: ASN(RDA), USFF, OPNAV N8, HQMC DC, P&R and DC, CD&I, SYSCOM (As required: N1, M&RA, N2, Intel, N3/N5, PP&O, N4, I&L, N6, DirC4/CIO)
  - Non-voting participation: DASN, WE lead, N80, N81, Fiscal, Resource Sponsor, PEO
- Input Criteria:
  - JROC approved ICD
  - Completed AoA
  - MS A documentation sufficiently mature for Senior Service leadership review.
- Goals / Exit Criteria:
  - Evaluation / Examination / Validation of AoA findings (PA&E approves ACAT I AoA results) by Senior leadership
    - Pursue material solution to validated gaps
  - Capability requirements (performance parameters) recommendations:
    - Threshold and objective values, Material / Non-material solutions
  - Approval to develop CDD and CONOPS with guidance and assumptions
  - Approval to proceed to next event (i.e. Gate 3 or MS A)



# Gate 2

## AoA Validation (continued)

- Brief Content: AOA report summarizing findings (material solution, life cycle considerations, costs, capability requirements and DCRs) plus:
  - Recommended CDD and CONOPS guidance (to include technology protection and interoperability (domestic and foreign))
  - Preliminary configurations guidance
  - Preliminary TRLs for material solutions
  - Assessment of Industrial Base
  - Program Health
    - Funding sufficient
    - Risk assessment
    - Program Office / HQMC / OPNAV staffing sufficient
    - Defined commonality, maintainability, supportability requirements
    - Completeness and maturity of applicable standards
  - Projected Life Cycle costs for all options
- Examples: Air and Missile Defense Radar (AMDR), Airborne Resupply / Logistics for Seabasing (AL / LSB)



# Gate 3

## CDD and CONOPS Approval

- **Lead organizations: OPNAV (CDD) and USFF (CONOPS)**
  - Chair: CNO / CMC / VCNO / ACMC
  - Members: ASN(RDA), USFF, OPNAV N8, HQMC DC, P&R and DC, CD&I, SYSCOM (As reqd: N4, I&L, N6, DirC4/CIO)
  - Non-voting participation: DASN, WE, N80, N81, Resource Sponsor, PEO
- **Input Criteria:**
  - OSD approved AoA and AoA update (if required)
  - Completed Service review of CDD and CONOPS
  - Completed SDS Development Plan (w/ assessment of Critical Program Information and design for export)
- **Goal / Exit Criteria:**
  - Approval of CDD for Joint Staff routing / JROC approval
  - Approval of CONOPS
  - Direction to develop System Design Specification (SDS) (to include determination of potential for export)
  - Program Health
  - Approval to continue with MS A or Gate Four preparations





# Gate 3

## CDD and CONOPS Approval (continued)

- **Brief Content: JROC compliant CDD brief plus**
  - Summary of CONOPS with USN and USMC concurrence
  - CDD Description including KPPs & KSAs
  - SDS Development Plan summary
  - Independent initial cost and comparison to program management schedule estimates
  - Recommended Operational and Technical Authority assumptions guidance
  - Program Health
- **Examples:** Maritime Pre-Positioning Force (Future) (MPF(F)), Joint Maritime Assault Connector (JMAC)



# Gate 4

## SDS Approval

- Lead organization: ASN(RDA)
  - Chair: ASN(RD&A)
  - Members: VCNO, ACMC, N8, HQMC DC, P&R and DC, CD&I, WE lead, SYSCOM, PEO (As required: N1, M&RA, N4, I&L, N6, DirC4/CIO)
  - Non-voting participation: DASN, WE lead, N80, N81, Resource Sponsor, USFF (N8), MARFOR
- Input Criteria:
  - Navy approved CDD
  - Navy approved CONOPS
  - Completed Service Reviewed SDS
  - Independent cost estimates are understood and compared to PM (to include anti-tamper costs for domestic and foreign)
- Goals / Exit Criteria:
  - Approved System Design Specifications (SDS)
  - Naval approval to proceed to DAB
  - Approval of Anti-tamper Plan (domestic & foreign)
  - Program Health



# Gate 4

## SDS Approval (continued)

- Brief Content: Major Program Capability Review focused on
  - System alignment with validated capabilities
  - Identify technical requirements
  - Risk in developing program
  - Cost and schedule estimates
  - Establishing triggers for R3B re-review
  - Producibility
  - Program Office / staff manning sufficient
  - Program Readiness review Program Health
    - Standards
    - Staff
    - Budget
    - Financial review
- Examples: Broad Area Maritime Surveillance (BAMS), 21 Inch Mission Reconfigurable Unmanned Undersea vehicle System (MRUUVS), Joint High Speed Vehicle (JHSV)



# Gate 5

## RFP Approval

- Lead organization: ASN (RDA)
  - Chair: ASN (RD&A)
  - Members: VCNO, ACMC, OPNAV N8, HQMC DC, P&R and DC, CD&I, WE lead, SYSCOM (As required: PEO, N1, M&RA, N4, I&L, N6, DirC4/CIO)
  - Non-voting participation: DASN, N80, N81, Resource Sponsor, USFF (N8)
- Input Criteria:
  - Approved System Design Specification (SDS)
  - DAB approval (Milestone B)
  - Business process / business arrangements defined in Acquisition Strategy



# Gate 5

## RFP Approval (continued)

- Goals / Exit Criteria:
  - Approval for RFP release
  - Program Readiness review Program Health
    - Standards
    - Staff
    - Budget
    - Financial review
  - Illumination and approval of buy & build business strategy
- Brief Content: Same as Gate 4 plus
  - Technical requirements
  - Consideration of potential export/co-development
  - Program Health (Cost, schedule, technical risk, staffing sufficient)
- Example: Zumwalt Class Destroyer (DDG-1000), Future Aircraft Carrier (CVN-21)





# Gate 6

## Sufficiency Review

- Lead organization: ASN (RDA)
  - Chair: ASN (RD&A), CNO / CMC
  - Members: VCNO, ACMC, OPNAV N8, HQMC DC, P&R and DC, CD&I, WE lead, SYSCOM (As required: N1, M&RA, N4, I&L, N6, DirC4/CIO)
- Input Criteria:
  - Source Selection Complete
  - Contract Awarded
  - Integrated Baseline Review Complete
- Goals / Exit Criteria:
  - Program Management Baseline (PMB) established and will meet SDS
  - Program Readiness review Program Health
    - Standards
    - Staff
    - Budget
    - Financial review
  - IBR Satisfactory



# Gate 6

## Sufficiency Review continued

- Brief Content – Gate 5 plus IBR Results
  - Integrate with budget cycle and POM/PR processes
  - Plan to initiate applicable disclosure reviews
- Examples: Advanced Hawkeye (E-2D), Standard Missile-6 (SM-6), VH-3d Presidential Helicopter Fleet Replacement Program (VH-71)